

## **Reduced graphene oxide-titania nanocomposite-modified photoanode for efficient dye-sensitized solar cells**

### **ABSTRACT**

We report the successful application of reduced graphene oxide–titania (rGO–TiO<sub>2</sub>) nanocomposite as an efficient photoanode for dye-sensitized solar cell (DSSC). The DSSC assembled with the rGO–TiO<sub>2</sub>-modified photoanode demonstrated an enhanced solar to electrical energy conversion efficiency of 4.74% compared with the photoanode of DSSC composed with unmodified TiO<sub>2</sub> (2.19%) under full sunlight illumination (100 mW/cm<sup>2</sup>, AM 1.5G) as a result of the better charge collection efficiency of rGO, which reduced the back electron transfer process. Influence of the rGO content on the overall efficiency was also investigated, and the optimal rGO content for TiO<sub>2</sub> was 0.5 mg. Further, the modification of rGO–TiO<sub>2</sub> on the compact layer TiO<sub>2</sub> surface led to an increase in efficiency to 5.83%. The superior charge collection and enhanced solar energy conversion efficiency of the rGO–TiO<sub>2</sub> nanocomposite makes it to be used as a promising alternative to conventional photoanode-based DSSCs.

**Keywords:** rGO–TiO<sub>2</sub>; Nanocomposite; Dye-sensitized solar cells; Photocurrent; Solar energy; Graphene; Thin film; Blocking layer